Agrium

KENAI GASIFICATION project

project summary phase 2 spring 2007

phase 2 project summary

The Cook Inlet region of Alaska has a variety of established industries that were built around an abundance of low cost natural gas. The natural gas supply is vanishing which is forcing industry to cease operations as well as raising the cost of fuel for utilities and consumers. The Kenai Gasification Project employs commercially proven technology and capitalizes on unique market conditions, strategic partnerships and alliances to provide a long-term commercial alternative to natural gas reliance.

The diversity and synergies offered by the Kenai Gasification Project are significant. The Project would retain the annual production of over two million tonnes of ammonia and urea. It would provide an opportunity for Railbelt utilities to make available, reliable and competitively priced power in a region with aging and expensive generation. Environmental emissions could be reduced through proven technology as well as provide excess carbon dioxide (CO_2), which could be used to recover up to 300 million barrels of oil through enhanced oil recovery in Cook Inlet. Finally, the project could result in the retention and creation of over 500 long-term Alaskan jobs.

The Project

The Kenai Gasification Project employs developed technology and capitalizes on unique market conditions, strategic partnerships and alliances to provide a long-term commercial alternative to natural gas reliance within Alaska. The project objective is to site a world class gasifier and a power generation plant adjacent to Agrium's Kenai Nitrogen Operations (KNO) facility. The plant would begin production in 2011. One gasifier train would produce the hydrogen (H_2), nitrogen (N_2), steam and CO_2 required by both KNO and strategically positioned companies in Cook Inlet. Environmental concerns are addressed through utilization of proven technology.

The diversity and synergies offered by the Kenai Gasification Project are immense. The Kenai Gasification Project could retain the annual production of ammonia and urea from KNO, along with associated jobs, community support and business opportunities for Alaska companies. In addition, the project could provide low cost power for sale into the Railbelt and excess CO_2 to recover up to 300 million barrels of oil through enhanced oil recovery. It would also assist in the economics of other Alaskan communities and companies by supplying an economic alternative for by products and demand for services.

With almost 40 years of Alaska experience, the Kenai nitrogen facility has been able to successfully compete in the export fertilizer market. However, declining natural gas supplies and lack of further development may force the facility to cease operations in the near future. Based on an abundant Alaska resource, coal, this project could effectively mitigate the volatility associated with the traditional natural gas based fertilizer producers. Nearby coal reserves are projected to provide well in excess of 100 years of economic development. This enables Alaska to retain a value-added facility, continues to diversify the state portfolio and capitalizes on the operations experience of one of the world's leading fertilizer companies.

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The Kenai Gasification Project could also improve the Railbelt energy mix by decreasing natural gas power production. Cook Inlet natural gas now uses national benchmark pricing resulting in significantly higher prices and volatility. The stability offered through long-term coal contracts offers a stable solution. By leveraging an existing billion dollar fertilizer plant, development and operations of the Kenai Gasification Project significantly enhances the value proposition of the power generation. These synergies extend into the enhanced oil recovery opportunities and other benefits. Further, the existing highly skilled employment base and support industries of the Kenai Peninsula enhance the project's credibility and sustainability.

Location of Project

Situated on the ice-free port of Nikiski, located on Cook Inlet in south central Alaska, the Kenai Gasification Project is uniquely located in a developed industrial area. Kenai offers a developed economy dedicated to the support of industry in the Alaska environment.

The Market and Industry

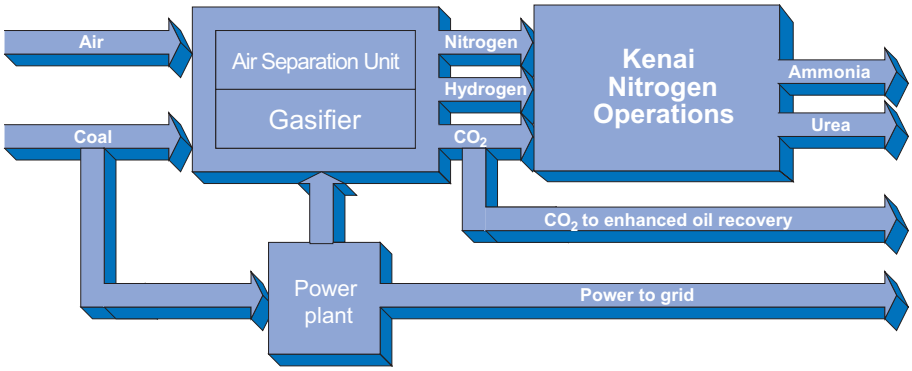
The Kenai Gasification Project would target the Pacific Rim market and focus on urea production. There has been a pronounced shift to urea within this market as urea growth has averaged 3.5% over the past ten years and is expected to grow at 2-3% per annum. The Pacific Rim market is currently served by product sourced out of the Middle East, the former Soviet Union, Malaysia and Kenai. Within this market, Kenai continues to enjoy a strategic advantage with its location and proximity to market. With a significant savings in shipping costs Kenai has been able to compete in the Asian markets, with strong relationships with Korea, Mexico and as far south as eastern Australia. The current outlook continues to support these market fundamentals.

With high cost power production in Alaska, the Railbelt is well positioned to accept a new source of lower cost, environmentally friendly, coal fired power production. The high decline rates on the natural gas supply are forcing consumer prices higher and are limiting the availability of new natural gas power production. Coal based production addresses this concern and offers an economic solution.

The Kenai Gasification Project Business Model/Strategy

The basis of the Kenai Gasification Project business model is predicated on the long-term viability of the strategic partnerships and alliances required to make this project successful. The project derives significant synergies from the integration of the nitrogen facility, power plant, air separation unit, feedstock supply and gasifier.

The current model of The Kenai Gasification Project envisions that the ultimate structure will include several strategic partners with an interest in individual project components with strong contractual ties. Agrium brings nitrogen production experience, marketing capability, and market network to maximize value for the fertilizer product. As one coal source alternative, the existing Usibelli Coal Mine in Healy, Alaska can meet the feedstock requirements of the project and has over 60 years of experience as the only operating Alaskan coal mine. The proven experience of Agrium combined with the excellent operating performance of the Kenai Nitrogen Operations team is a strong foundation on which to build the Kenai Gasification Project. Other strategic partners will be integrated to enhance this foundation into a thriving long-term operation.



How it Works

The chemistry of gasification has been well known since the late 18th century. The process of gasification is essentially the controlled, but incomplete, combustion of carbon containing molecules. Gasification can be applied to a variety of feedstock including heavy oils, petroleum coke, coal, and even biomass. In the case of the Kenai Gasification Project, coal is the carbon source for the gasification reaction:

$$\text{Coal} + H_2O + O_2 \rightarrow CO + H_2 \text{ (Syngas)}$$

In this reaction coal (which is mostly composed of carbon and water) is partially oxidized using pure oxygen to form a mixture of carbon monoxide and hydrogen. This mixture of carbon monoxide (CO) and hydrogen (H_2) is commonly referred to as "syngas" because this mixture can be further synthesized into many forms.

In the Kenai Gasification Project, the syngas mixture would be further refined into pure hydrogen using the same carbon monoxide shift reaction that is already used by Agrium in the production of ammonia:

$$CO + H_2O \rightarrow CO_2 + H_2$$

In the shift reaction, water is used to convert the carbon monoxide to carbon dioxide while producing even more hydrogen. The hydrogen is used to make ammonia and the carbon dioxide is reacted with ammonia to make urea.

The Kenai Gasification Project Components

Coal Supply

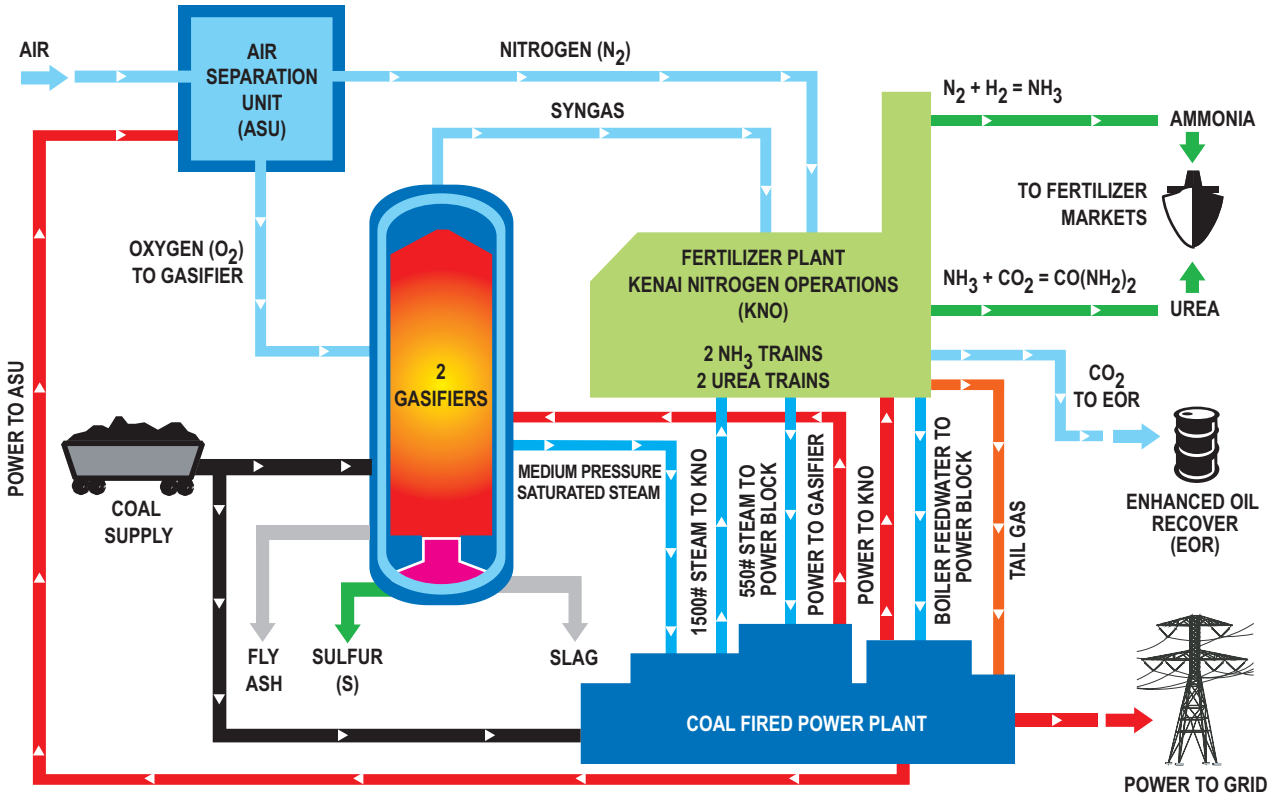
The Kenai Gasification Project could utilize approximately three million metric tonnes of coal per year. The project is evaluating options associated with utilization of coal from Healy and other coalfields as well as ways to transport the coal to the facility. Phase 2 of the project continues to develop on the coal supply options and narrows the scope to identify the most strategic alternative.

Gasifier Block

Two coal gasification trains could utilize Alaskan coal to produce the syngas mixture of hydrogen and carbon monoxide that would be further processed by KNO. The gasification process dries and pulverizes delivered coal conveying it to the gasifier where the coal reacts with sub-stoichiometric amounts of pure oxygen to form a gas stream rich in carbon monoxide and hydrogen (syngas). This gas is supplied to the KNO nitrogen plant where it will be further refined and combined with pure nitrogen from the air separation unit to be converted into ammonia (NH_3). Byproducts of slag and a small amount of sulfur from coal processing may also be recovered for sale.

Air Separation Unit

The air separation unit (ASU) processes air directly from the atmosphere to generate the nearly pure oxygen required by the gasification block. The air separation unit is the largest power consumer in the envisioned complex due to the large compressors required to liquefy and separate pure oxygen and nitrogen from the air. The gasifier block requires pure oxygen to process the coal, all of which is supplied by the air separation unit.



The Kenai Gasification Project Components continued

Power Block

South central Alaska and the entire Railbelt grid are in need of lower cost, reliable power. The current natural gas generators, which comprise over 65% of all Railbelt generation capacity, continue to age and prices continue to escalate. The Kenai Gasification Project envisions building a coal fired boiler to supply power to the Kenai Gasification Project and potentially the Railbelt grid. The project could require approximately 120 MW of power, which leaves the potential to generate additional power, perhaps as much as 70 MW, for sale into the grid. The project focuses on the emissions control technology and anticipates using emissions control that is considered best available control technology [BACT].

KNO Nitrogen Plant

Agrium's Kenai Nitrogen Operations (KNO) is the second largest nitrogen fertilizer production facility in the United States capable of producing over 1.1 million tonnes of urea annually. Agrium supplies fertilizer (urea) to Alaskan customers including farmers, greenhouse operators, and State airports. Currently operating at reduced capacity, this world-class facility is scheduled to permanently shut down on October 31, 2007 due to a lack of natural gas feedstock.

KNO would receive syngas from the new gasifier. This gas is reacted with water in the existing shift converters where the carbon monoxide (CO) is shifted into carbon dioxide (CO_2) and hydrogen (H_2). The CO_2 is then removed from the syngas and is sent to the urea plant or utilized for enhanced oil recovery. Finally, a pure hydrogen stream will be combined with pure nitrogen from the air separation unit and a high-pressure converter to form ammonia (NH_3). Ammonia produced in the ammonia converter is refrigerated and stored for sale or is combined with carbon dioxide (CO_2) from the ammonia plant in a high-pressure reactor to form urea (NH_2CONH_2). The urea is sold as the highest grade of solid nitrogen fertilizer.

Enhanced Oil Recovery

Excess CO_2 could be injected into the aging Cook Inlet oil fields to produce an estimated 300 million barrels of additional crude oil from these fields. The use of CO_2 to enhance the recovery of oil from existing fields has been demonstrated by other companies across North America. The unique properties of CO_2 allow this gas to dissolve into the remaining heavy oil in the reservoir and change the oil's flow characteristics. The result is oil flows easier, therefore more is recovered from the reservoir. The Department of Energy has sponsored two studies that identified the high potential for recovery in the Cook Inlet fields.

The Kenai Gasification Project Phase 2

Phase 1 of the Kenai Gasification Project demonstrated the viability of the project. The Kenai Gasification Project has now entered into a more detailed engineering analysis that will better define the project. The goal of Phase 2 is to develop a Front End Engineering Design (FEED) package. The FEED package will establish engineering definition sufficient to support an Engineer, Procure, and Construct (EPC) offering for the final design and construction of the project. Phase 2 also begins the environmental permitting and establishes the corporate structure and commercial agreements to advance the project.

Phase 2 Deliverables

Develop Front End Engineering Design (FEED) Package

The engineering deliverable for Phase 2 will be to refine the project design to the final design case and the level of detail in the estimate will be greatly increased over the feasibility investigations. This level of work is often referred to as a Front End Engineering Design (FEED) package. The detail of this design is highly specific and allows for a greater definition of the project, but not sufficient for the final design and construction of a facility. The FEED reduces the uncertainty around final project cost and allows for a better overall design by providing greater definition.

Perform Environmental Permitting

The environmental work will commence in Phase 2.

The goal of this work will be to develop any data collection and modeling required to support the project and begin the permitting process. It is envisioned that the permitting and National Environmental Policy Act (NEPA) process work will begin in Phase 2.

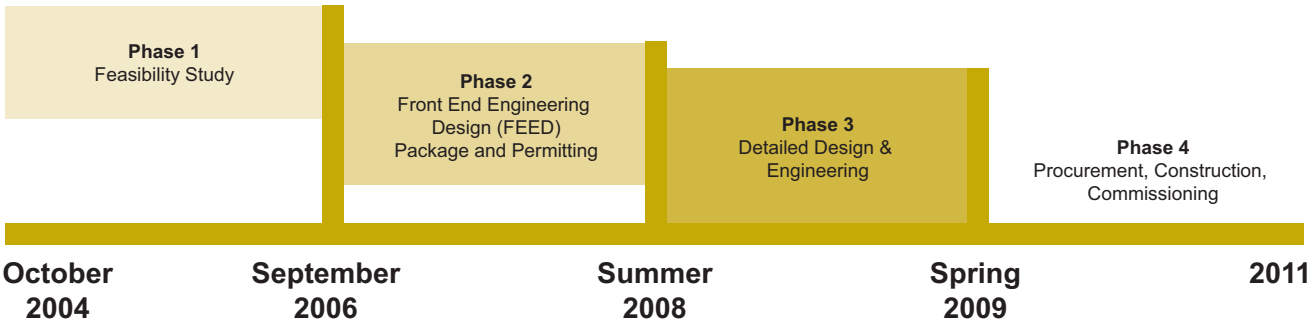
Produce Bankable Documents to Secure Financing

The Kenai Gasification Project offers a number of potential commercial opportunities. A major focus of Phase 2 will be to define the commercial opportunity and establish a corporate structure to execute the Kenai Gasification Project. This will require an assessment of coal supplies and development of financial terms for raw material supply and product offtake agreements. The combination of these agreements and other documents including financial models will support financing for Phase 3 and Phase 4.

The Major Parts of the FEED are:

- A FEED Definition study that refines the design from the Phase 1 investigation.
- Integration studies supporting the project integration with the KNO facilities.
- A Class 3 capital cost estimate as defined by the Association for the Advancement of Cost Engineering International.
- Detailed engineered process and utility equipment lists.
- Project drawings such as:
  - Basic process units block flow diagrams.
  - Process flow diagrams for all process systems.
  - Plot plan for all project facilities.
  - Electrical Single Line Diagram for generation facilities and electrical connection to the Gasification Plant and KNO.
  - Preliminary Piping and Instrument Diagrams (P&IDs) for all process facilities.
- Detailed estimates for the following categories:
  - Operating costs (other than coal).
  - Operations and Maintenance Manpower requirements.
  - Anticipated Maintenance costs.
  - Estimate of the availability for the major pieces of equipment.
- Detailed Project Implementation Plan.
- Estimated plant emissions, discharges and waste products.

Project Timeline



Phase 1
Feasibility Study (complete)

- Feasibility Engineering
- Environmental Scoping and Planning
- Develop Project Funding Plan

Phase 2
Front End Engineering Design (FEED) Package and Permitting (in progress)

- Develop Basic Engineering Package
- Environmental Permitting
- Produce Bankable Documents to Secure Financing

Phase 3
Detailed Engineering

- Detailed Design and Engineering
- Finalize Environmental Permitting

Phase 4
Construction and Startup

- Procurement
- Construction
- Commissioning

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KENAI GASIFICATION project

HEA Homer Electric Association, Inc.
A Touchstone Energy® Cooperative
The power of human connections

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